

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 05H070
STATION NAME: Squire Creek at Squire Creek Park
WATER YEAR: 2007
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Introduction

Watershed Description

Squire Creek drains a steep, north-facing basin covering about 20 square miles upstream of the gage at Squire Creek Park. Much of the basin lies in the Boulder River Wilderness as the stream drains the flanks of Three Fingers South and Whitehorse Mountain. Elevation in the basin ranges from 460 ft at the gage to more than 6800 ft on the higher peaks. Mean basin elevation is 2590 ft. Average basin slope is 57 percent. Over 60 percent of the area is covered in forest canopy. Mean annual precipitation is about 93 inches. Squire Creek and its tributaries provide more than 13 miles of spawning habitat for Chinook, Coho, pink and chum salmon, as well as for steelhead and resident trout.

Gage Location

The gage is on the right bank of Squire Creek, north of the Highway 530 bridge. Access for gage maintenance is through Squire Creek Park property.

Table 1. Basin Area and Legal Description

| | |
|---------------------------------------|---------------------|
| Drainage Area (square miles) | 19.8 square miles |
| Latitude (degrees, minutes, seconds) | 48, 16, 13 (NAD83) |
| Longitude (degrees, minutes, seconds) | -121, 40, 19(NAD83) |

Table 2. Discharge Statistics.

| | |
|---|----------|
| Mean Annual Discharge (cfs) | 217 cfs |
| Median Annual Discharge (cfs) | 139 cfs |
| Maximum Daily Mean Discharge (cfs) | 3800 cfs |
| Minimum Daily Mean Discharge (cfs) | 0.09 cfs |
| Maximum Instantaneous Discharge (cfs) | 6460 cfs |
| Minimum Instantaneous Discharge (cfs) | 0.09 cfs |
| Discharge Equaled or Exceeded 10 % of Recorded Time (cfs) | 382 cfs |
| Discharge Equaled or Exceeded 90 % of Recorded Time (cfs) | 18 cfs |
| Number of Days Discharge is Greater Than Range of Ratings | None |
| Number of Days Discharge is Less Than Range of Ratings | None |
| Number of Un-Reported Days | None |
| Number of Days Qualified as Estimates | 182 days |
| Number of Modeled Days | 19 days |

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Table 2 Discussion (Discharge Statistics)

Water year 2007 had the second-highest annual mean discharge and the fourth-highest median annual discharge for the period of record from water year 2005 through water year 2013. October of 2006 had one week of mean daily flows that were roughly equal to the lowest daily flows during the nine-year period of record. However, heavy rains occurred in early November, and the rest of the water year was among the wetter years in the period of record.

Table 3. Error Analysis Summary.

| | |
|--|------|
| Potential Logger Drift Error (% of discharge) | 3 % |
| Potential Weighted Rating Error (% of discharge) | 11 % |
| Total Potential Error (% of discharge) | 14 % |

Table 3 Discussion (Error Analysis)

The potential logger drift error of 3 percent of discharge refers to the amount of instrument drift that has been corrected using a time-weighted adjustment to the stage record.

The potential weighted rating error of 11 percent is calculated based on the quality of individual discharge measurements used to define the rating and on the degree to which those defining measurements conform to the rating curve.

Table 4. Stage Record Summary

| | |
|--------------------------------|----------|
| Minimum Recorded Stage (feet) | 2.93 ft |
| Maximum Recorded Stage (feet) | 11.85 ft |
| Range of Recorded Stage (feet) | 8.92 ft |

Table 4 Discussion (Stage Record)

Of the 182 days qualified as estimated data, 57 days included data gaps that were filled using reference data from nearby stations that had been scaled by linear regression to estimate conditions on Squire Creek. An equal number of days were qualified as estimates due to an erratic or noisy data record in which the rapid variations in recorded stage values produced a discharge uncertainty equal to 10 percent of the mean daily flow. For nearly 50 days, the automated data record cannot not be linked to quality assurance observations of the staff gage due to unexplained breaks in the automated record. Finally, there were 19 days in which high-flow discharge could only be estimated using the slope-conveyance discharge model.

Table 5. Rating Table Summary

| | | | |
|------------------------------|-----------------------|--|--|
| Rating Table No. | 3 | | |
| Period of Ratings | 10/1/2005 - 9/30/2006 | | |
| Range of Ratings (cfs) | 0.09 to 9370 cfs | | |
| No. of Defining Measurements | 31 | | |
| Rating Error (%) | 11 % | | |

| | | | |
|------------------------------|--|--|--|
| Rating Table No. | | | |
| Period of Ratings | | | |
| Range of Ratings (cfs) | | | |
| No. of Defining Measurements | | | |
| Rating Error (%) | | | |

| | | | |
|------------------------------|--|--|--|
| Rating Table No. | | | |
| Period of Ratings | | | |
| Range of Ratings (cfs) | | | |
| No. of Defining Measurements | | | |
| Rating Error (%) | | | |

Table 5 Discussion (Rating Tables)

Channel geometry was stable throughout water year 2007. No rating shifts were observed during the year.

Table 6. Model Summary

| | |
|--|----------------------|
| Model Type (Slope conveyance, other, none) | Slope Conveyance |
| Range of Modeled Stage (feet) | 8.4 ft to 13.5 ft |
| Range of Modeled Discharge (cfs) | 1900 cfs to 9370 cfs |
| Valid Period for Model | Oct. 1 thru Sept. 30 |
| Model Confidence | +/- 5 % |

Table 6 Discussion (Modeled Data)

The slope conveyance model for Squire Creek is based on a cross-section and longitudinal survey taken on September 16, 2010, and on data from nine channel-control discharge measurements taken between December 2006 and November 2012. Results from this model are applied throughout the period of record for the station because of the overall stability of the channel geometry.

Table 7. Survey Type and Date (station, cross section, longitudinal)

| Type | Date |
|------|------|
| | |

Table 7 Discussion (Surveys)

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Activities Completed

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